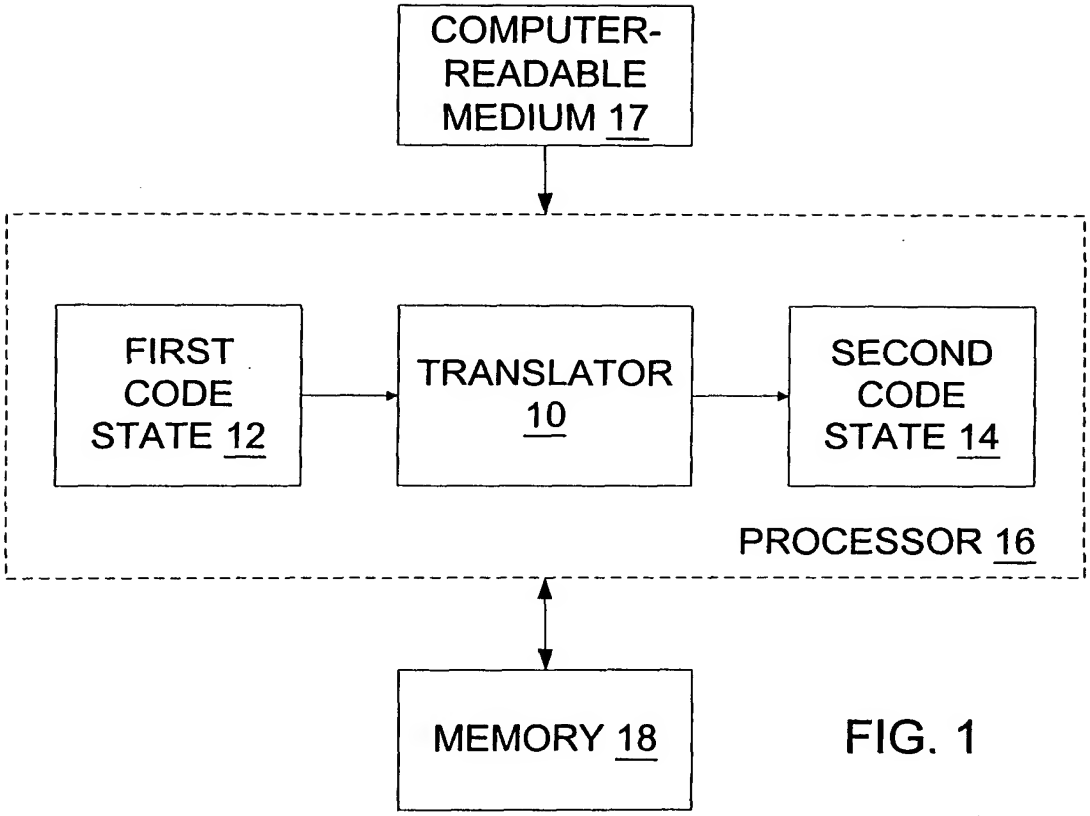

COMPUTER-READABLE MEDIUM 17
FIRST CODE STATE 12
TRANSLATOR 10
SECOND CODE STATE 14
PROCESSOR 16
MEMORY 18

FIG. 1

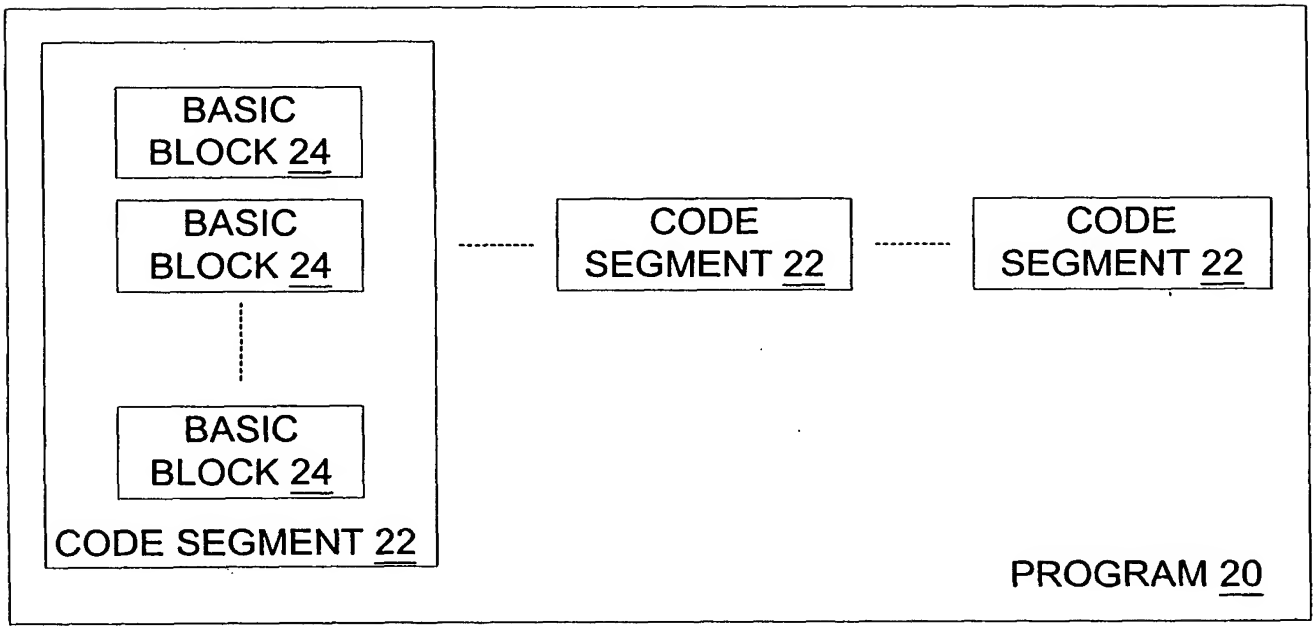

BASIC BLOCK 24
BASIC BLOCK 24
BASIC BLOCK 24
CODE SEGMENT 22
CODE SEGMENT 22
CODE SEGMENT 22
PROGRAM 20

FIG. 2

FIG. 3

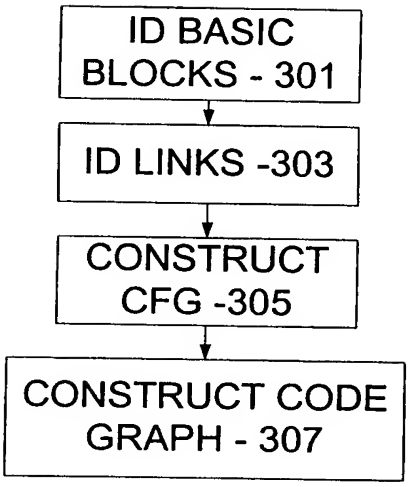
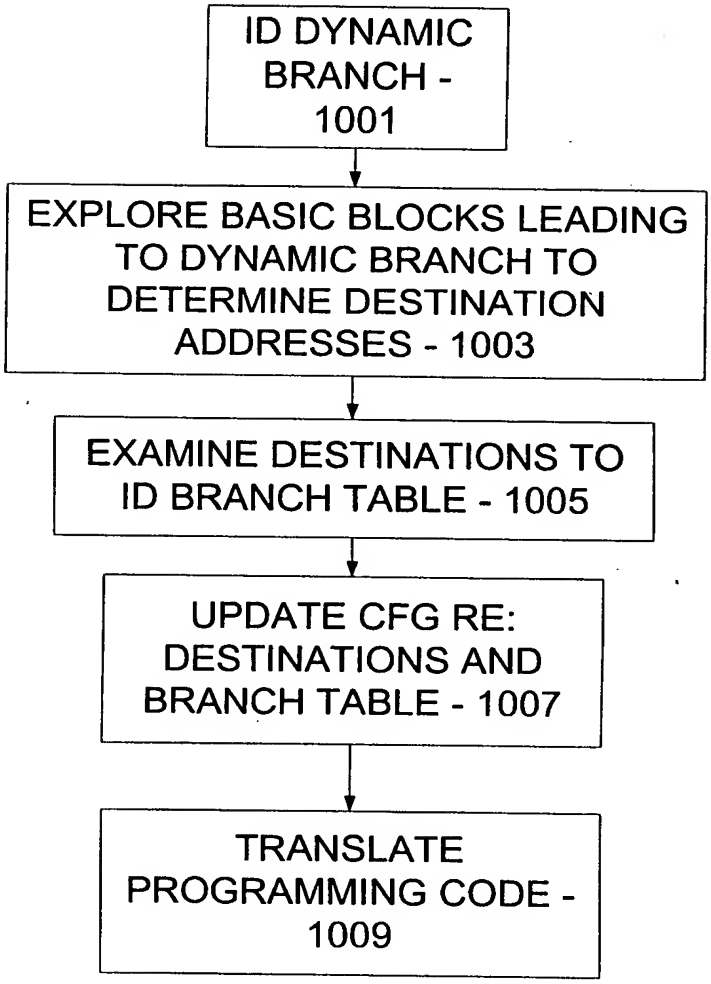

ID BASIC BLOCKS - 301
ID LINKS -303
CONSTRUCT CFG -305
CONSTRUCT CODE GRAPH - 307

FIG. 10


ID DYNAMIC BRANCH - 1001
EXPLORE BASIC BLOCKS LEADING TO DYNAMIC BRANCH TO DETERMINE DESTINATION ADDRESSES - 1003
EXAMINE DESTINATIONS TO ID BRANCH TABLE - 1005
UPDATE CFG RE: DESTINATIONS AND BRANCH TABLE - 1007
TRANSLATE PROGRAMMING CODE - 1009

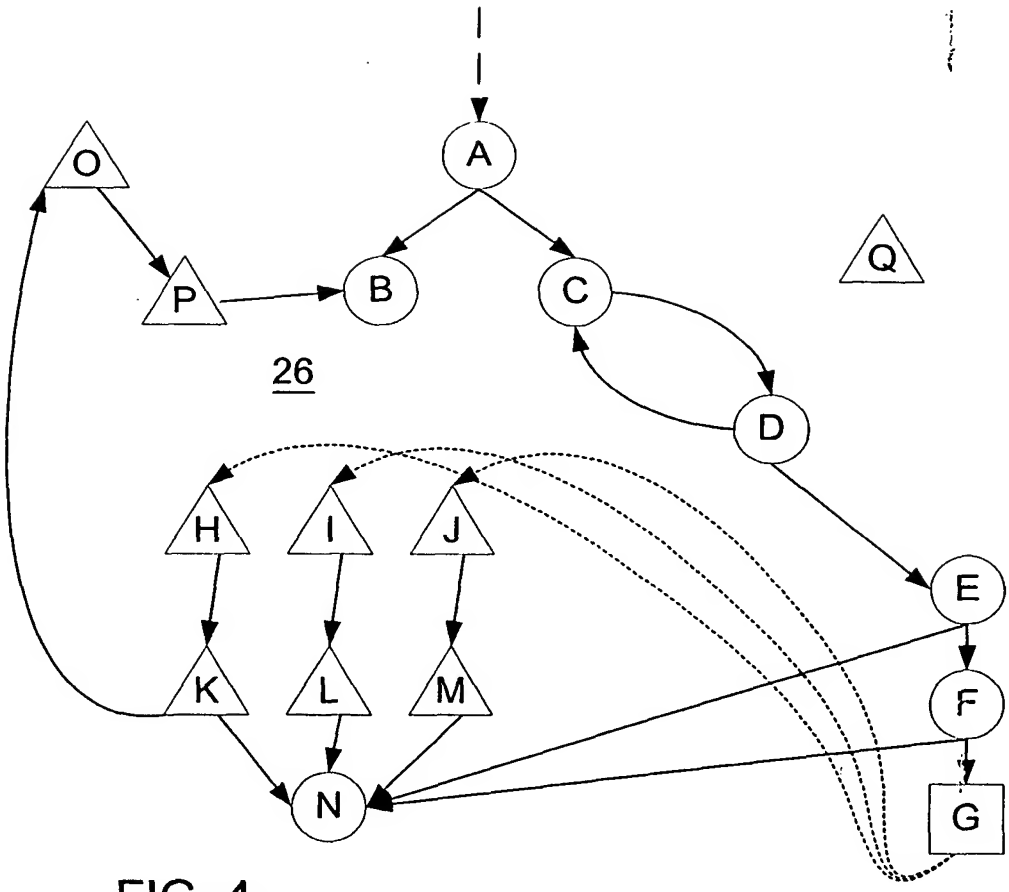

A
O
P
B
C
Q
26
D
H
I
J
E
K
L
M
F
N
G

FIG. 4

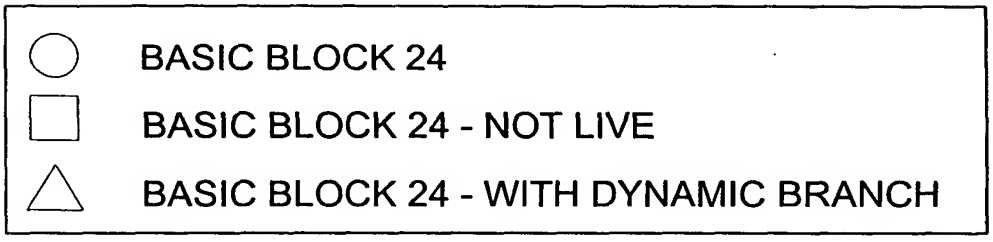
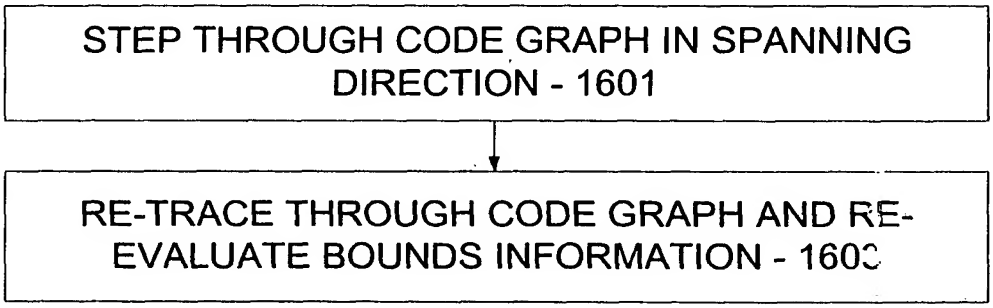

BASIC BLOCK 24
BASIC BLOCK 24 - NOT LIVE
BASIC BLOCK 24 - WITH DYNAMIC BRANCH

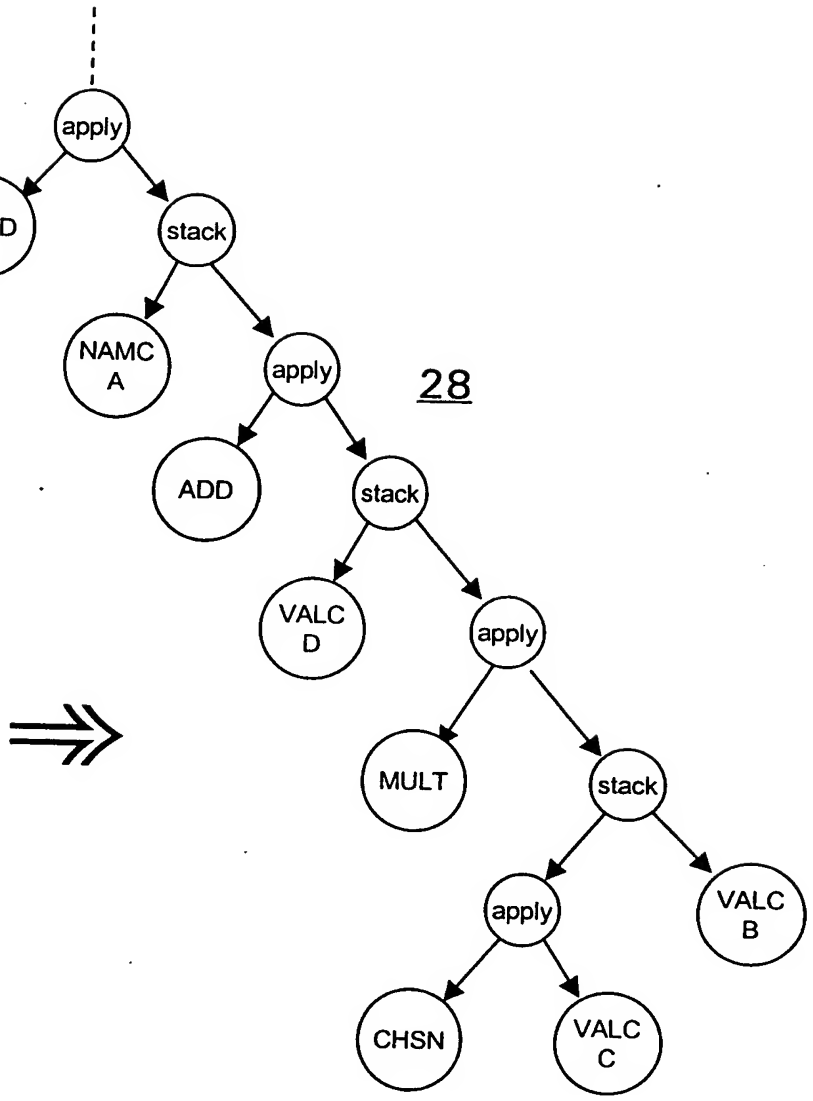
FIG. 16


STEP THROUGH CODE GRAPH IN SPANNING DIRECTION - 1601
RE-TRACE THROUGH CODE GRAPH AND RE-EVALUATE BOUNDS INFORMATION - 1603

24

A := (B * -C) + D;

VALC B
VALC C
CHSN
MULT
VALC D
ADD
NAMC A
STOD



28

FIG. 5

24

VALC B
DUPL
ADD

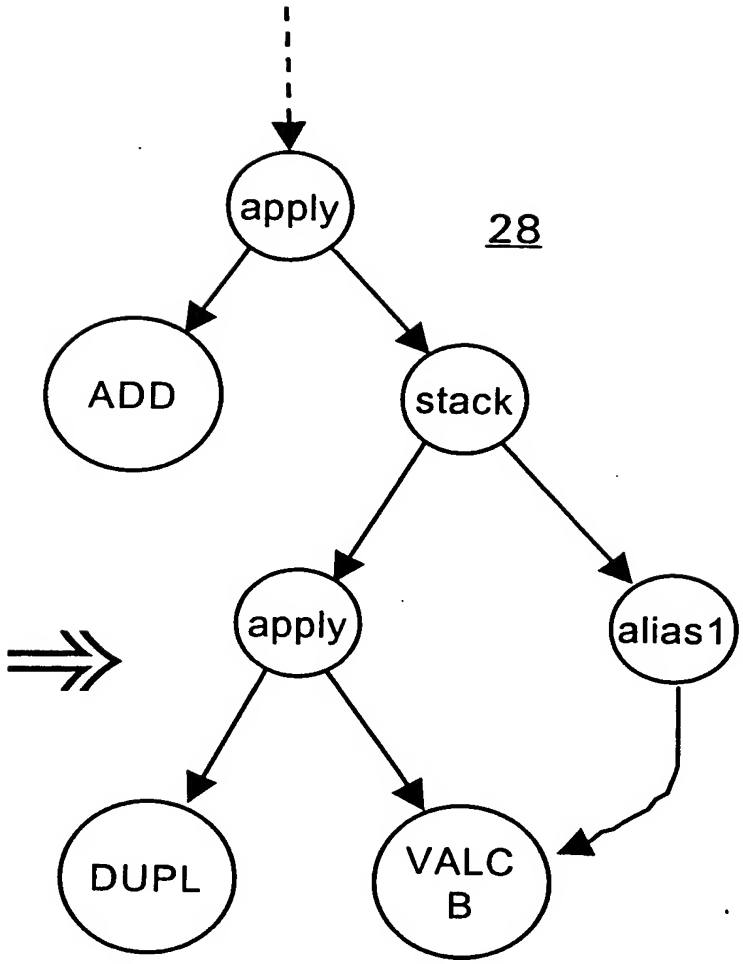


FIG. 6

VALC A
VALC B
VALC C
RSDN
ADD
MULT

24

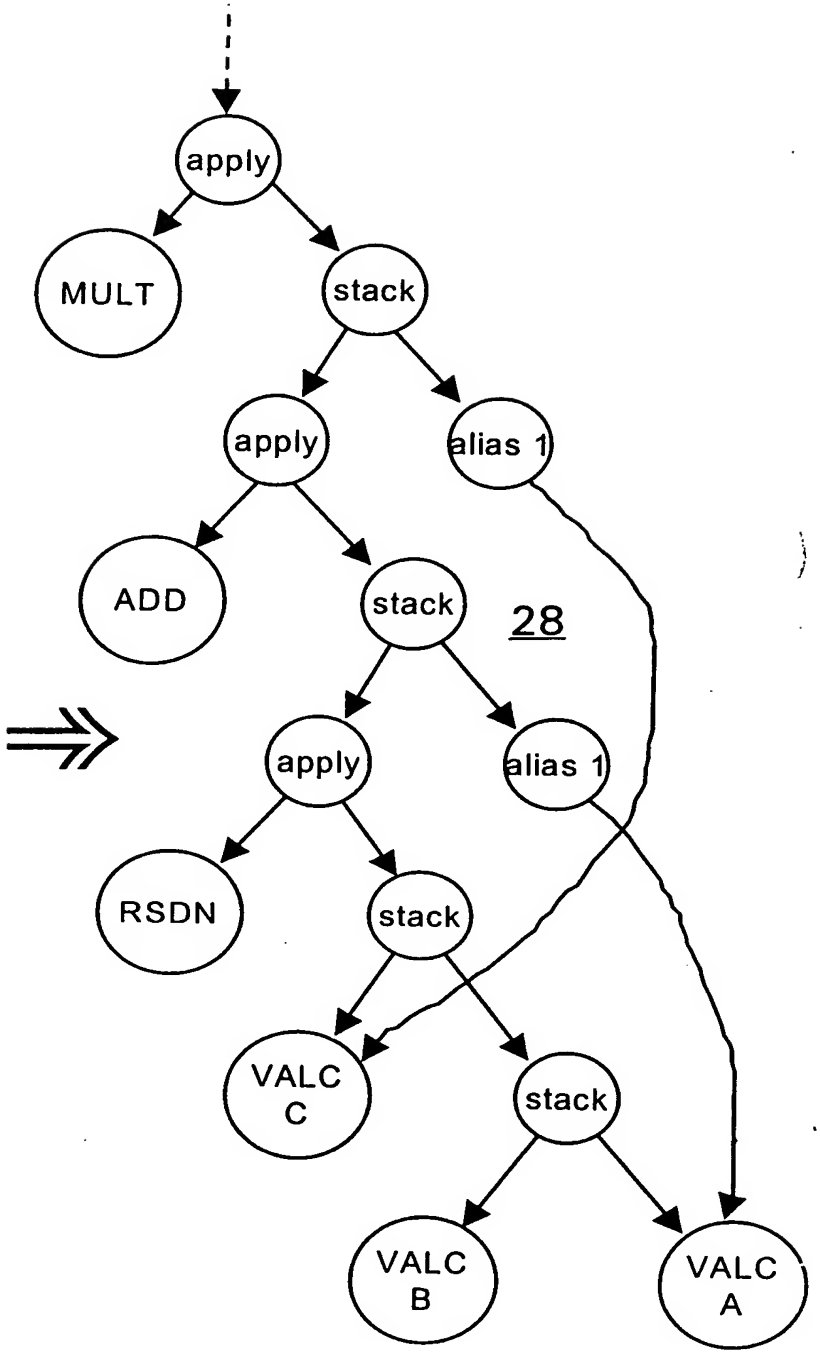


FIG. 7

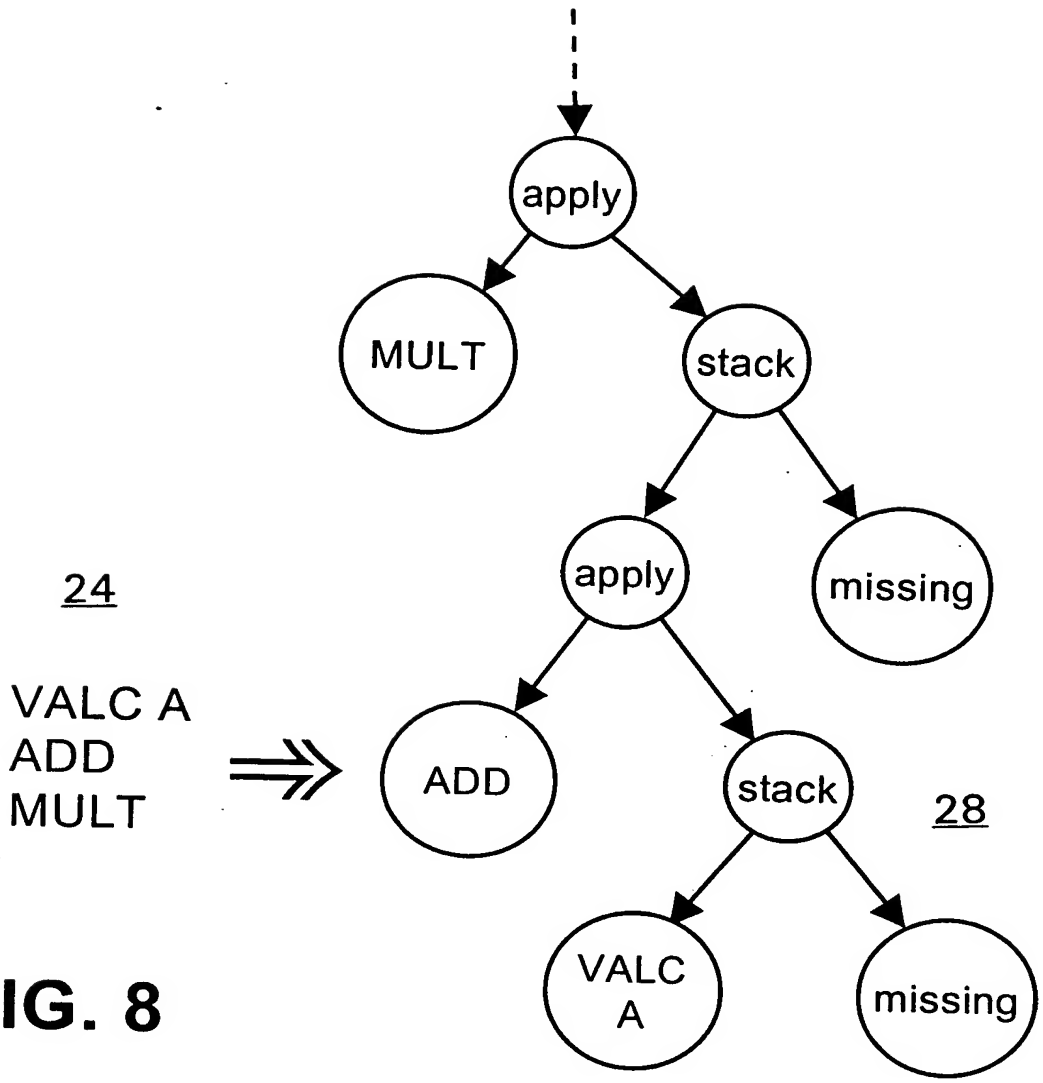

24
VALC A
ADD
MULT
apply
MULT
stack
apply
missing
ADD
stack
28
VALC
A
missing

FIG. 8

TEQU

24

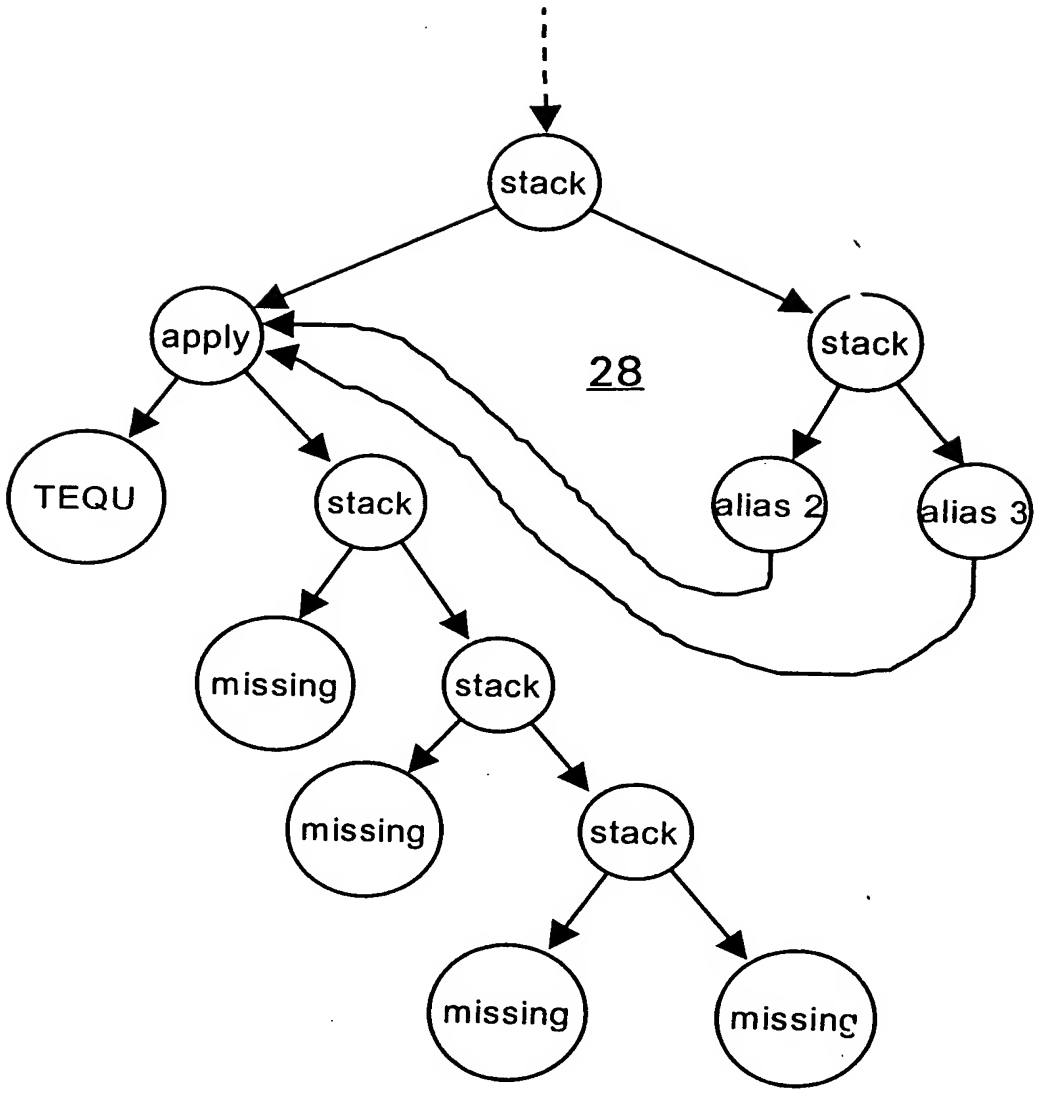

stack
apply
28
stack
TEQU
stack
alias 2
alias 3
missing
stack
missing
stack
missing
missing

FIG. 9

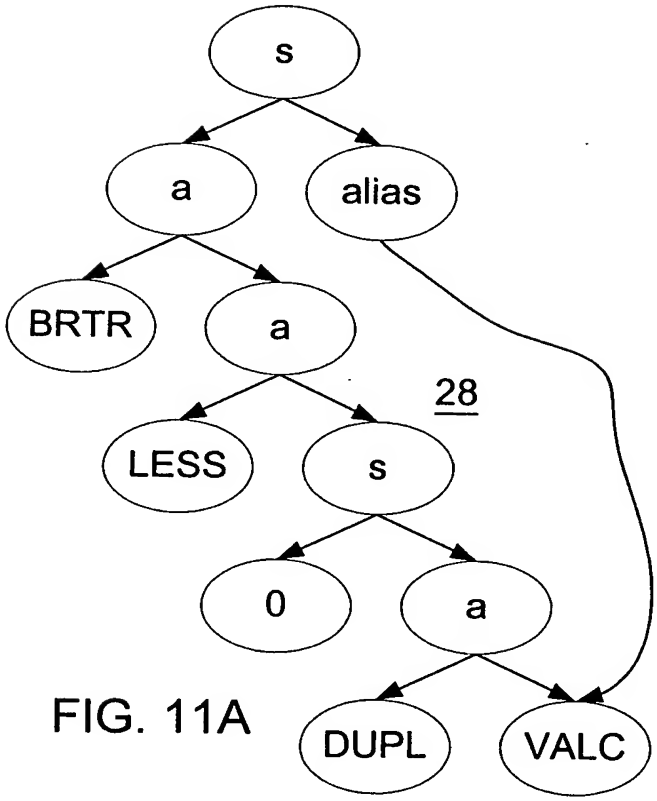


FIG. 11A

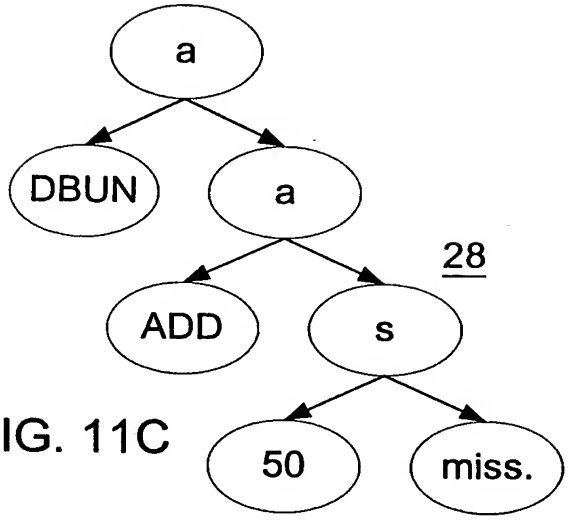


FIG. 11C

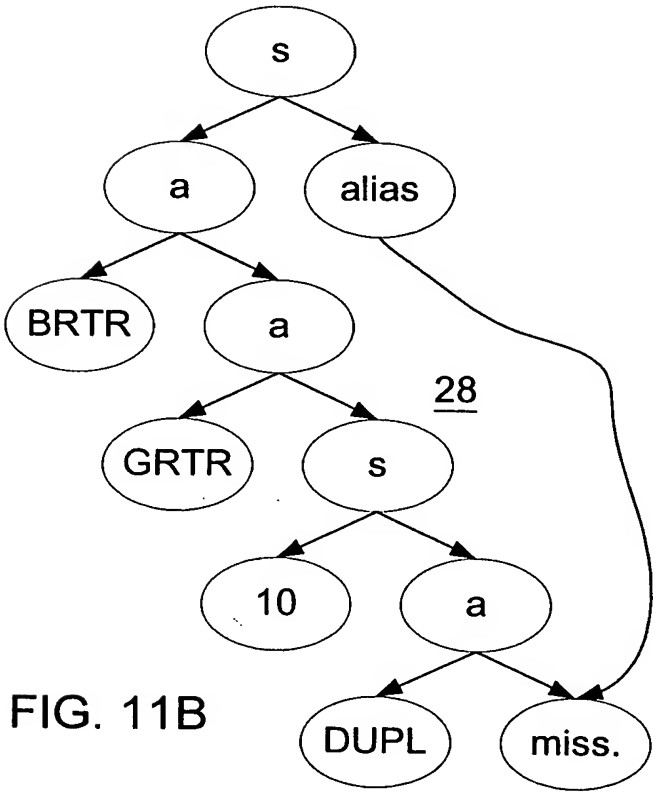


FIG. 11B

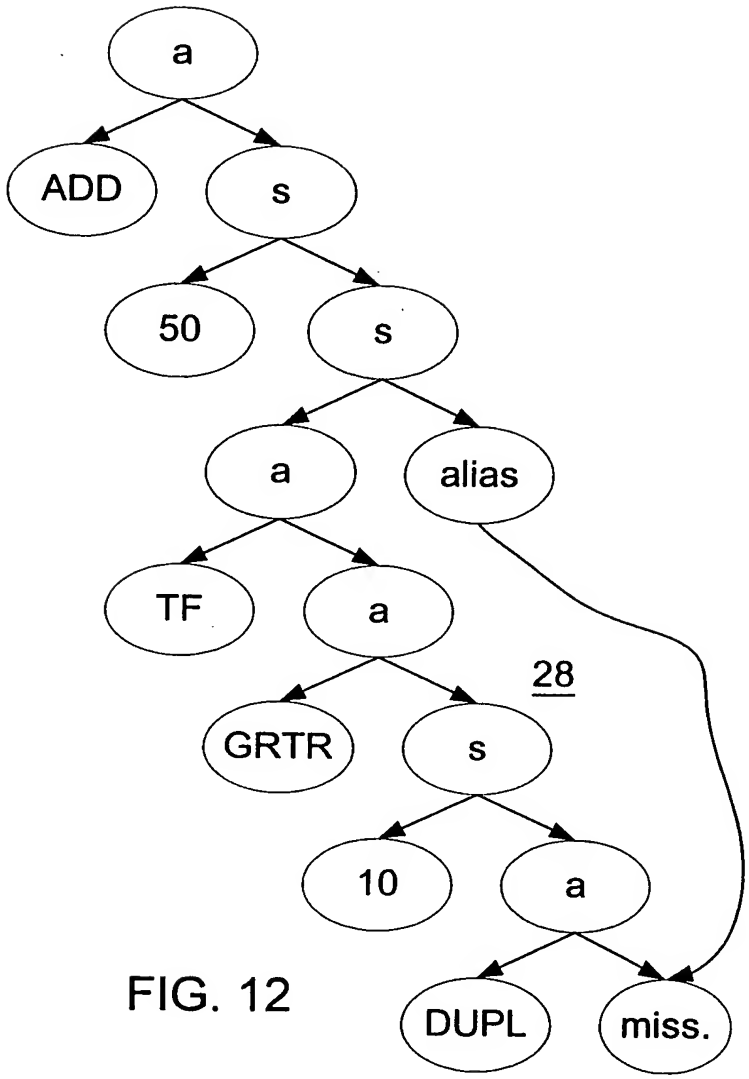


FIG. 12

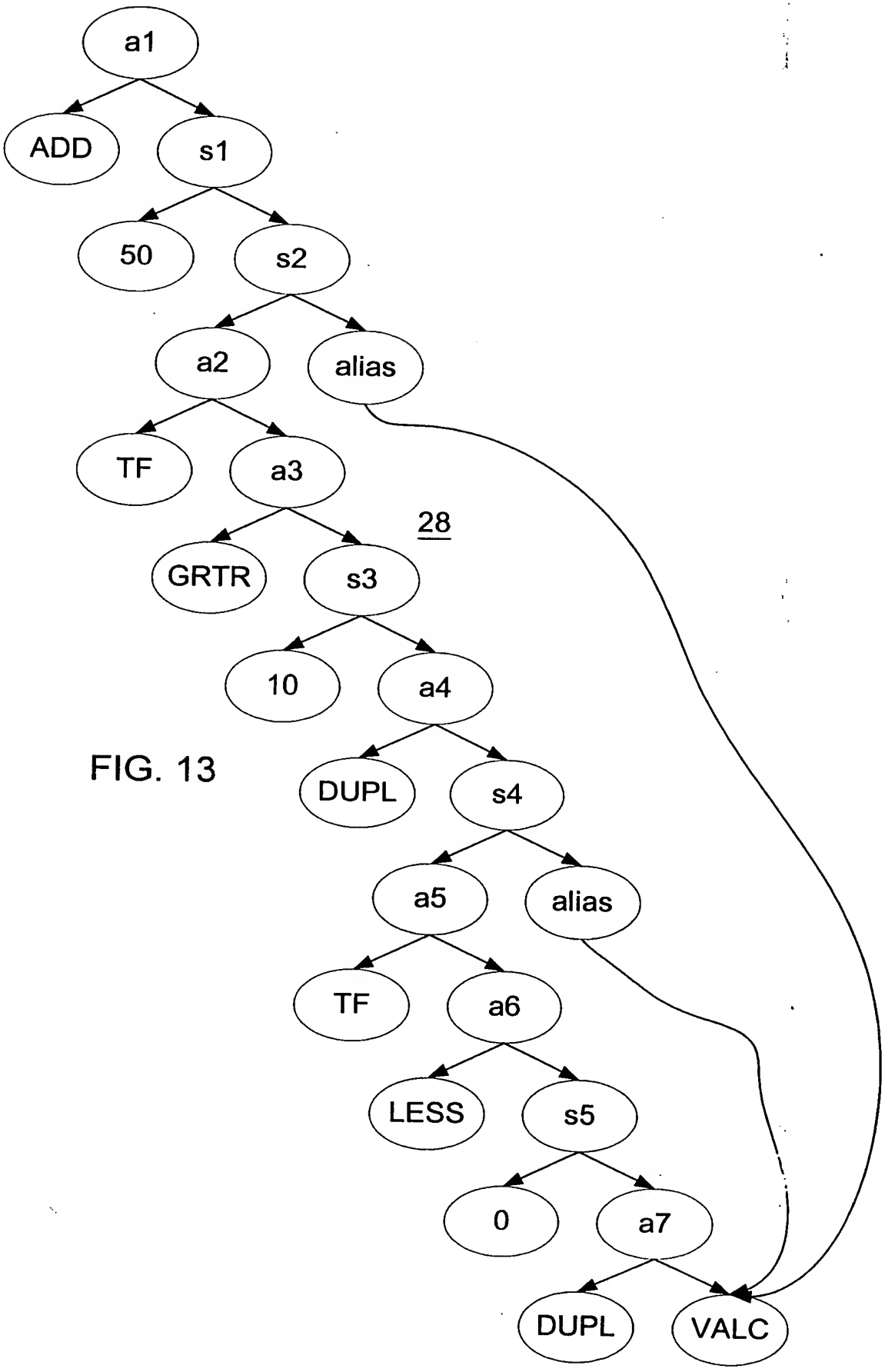

a1
ADD
s1
50
s2
a2
alias
TF
a3
28
GRTR
s3
10
a4
DUPL
s4
a5
alias
TF
a6
LESS
s5
0
a7
DUPL
VALC

FIG. 13

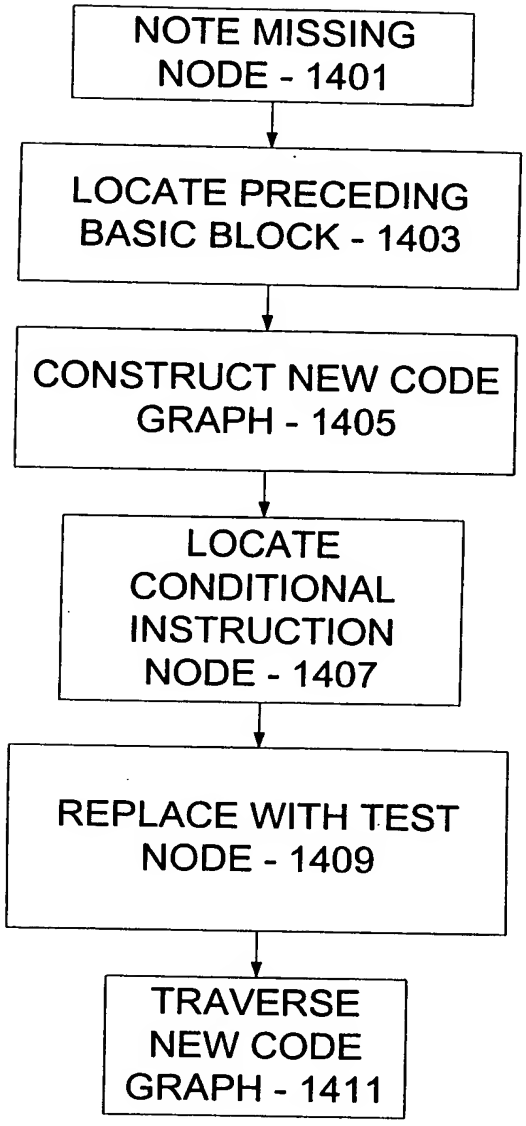

NOTE MISSING NODE - 1401
LOCATE PRECEDING BASIC BLOCK - 1403
CONSTRUCT NEW CODE GRAPH - 1405
LOCATE CONDITIONAL INSTRUCTION NODE - 1407
REPLACE WITH TEST NODE - 1409
TRAVERSE NEW CODE GRAPH - 1411

FIG. 14

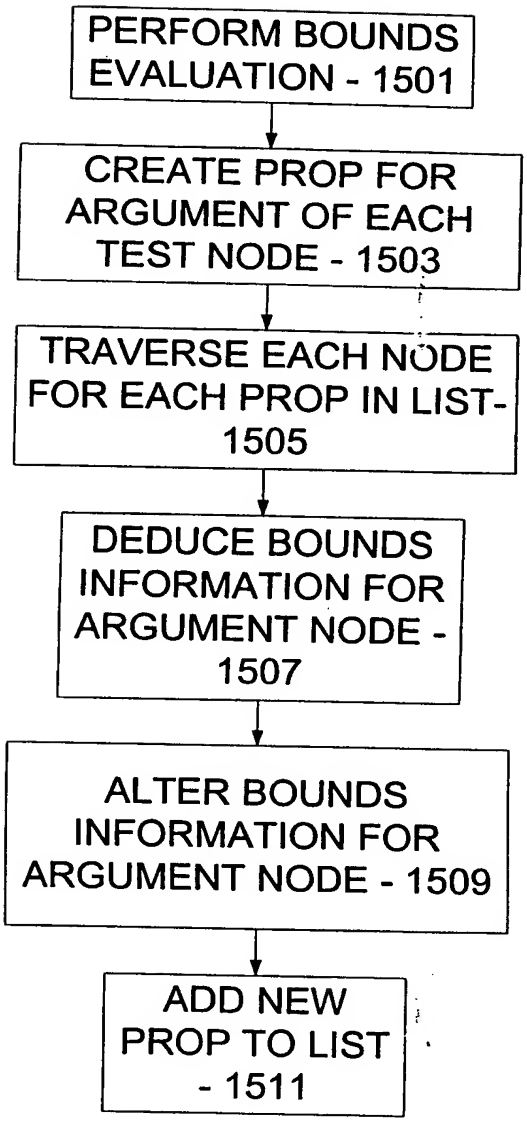

PERFORM BOUNDS EVALUATION - 1501
CREATE PROP FOR ARGUMENT OF EACH TEST NODE - 1503
TRAVERSE EACH NODE FOR EACH PROP IN LIST- 1505
DEDUCE BOUNDS INFORMATION FOR ARGUMENT NODE - 1507
ALTER BOUNDS INFORMATION FOR ARGUMENT NODE - 1509
ADD NEW PROP TO LIST - 1511

FIG. 15